



Addressing the Perceived Skills Gap

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While not without detractors, the perception of a skills gap remains prevalent among business leaders. After analysis of some salient trends, this article offers some modest near-term initiatives to address immediate skills gap concerns.

Skills gaps may be defined as an imbalance between the supply of skills needed by the workplace and the demand for these skills.¹ Skills gaps can lead to the less than satisfactory allocation of enterprise resources, leading to generally reduced economic opportunity.

THE SKILLS GAP AND ITS DIMENSIONS

Skills gaps exist in two forms. Undereducation, particularly among younger workers, negatively impacts productivity but may be offset by mentorship and training from older workers. Overeducation, typically involving advanced degrees at any age, on the other hand, tends to have a slightly more positive economic effect.² The case of social media content monitors in India and Pakistan does, however, reveal a negative side of

overeducation. Here, well-educated degreed workers were lured into this low-skill dead-end career during the COVID-19 slowdown.³ However, the popular focus of the so-called skills gap tends to focus on the adverse effects of undereducation.

Despite relatively low unemployment, nearly 70% of business leaders perceive a critical gap in the skills necessary to fulfill their mission in a technologically fueled economy.⁴ Skills shortages have long been associated with the adoption of advanced technologies.⁵ For example, 68% of U.K. employers report difficulty recruiting people with digital knowledge.⁶ Artificial intelligence (AI) has recently heightened the perceived shortfall. According to the World Economic Forum's (WEF's) top 10 list of skills in high demand, AI, as a technical skill, falls just below the critical cognitive skills of critical thinking and analytical capabilities. In 2016, the WEF estimated that 35% of the workforce would need a skills refresh over the next five years.⁷ By 2023, the post-COVID number jumped to 44% of the workforce spanning the next five years. This estimate was later complemented by a separate WEF observation that executives anticipate that 40% of the workforce will need to reskill over

the next three years as a result of the continued adaptation of AI.⁸

SOME HIGHER EDUCATION SHORTFALLS

While some decry the skills gap as a pure myth, based mainly upon full employment, superior school systems,

Traditional stovepipe compartmentalization and discipline specialization also prevent the kinds of cross-cutting knowledge that are increasingly important to the connected workplace.

Online and hybrid offerings represent another concern. The COVID-hastened transition to online and hybrid

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and sometimes, overeducation arguments, there are some signs that existing educational institutions are not serving lifelong learning well. This is true particularly where ever-evolving career-relevant skills are concerned. The U.S. National Center for Education Statistics reported a 15% COVID-19 period decline in U.S. undergraduate enrollments between 2010 and 2021. This decline is likely indicative of a demographic shift affecting higher education. However, a 9% growth was projected for the next decade. The same report, however, showed that only 22 out of 100 high school students eventually secure a “good job” with a degree.⁹ But the reported enrollment decline also likely reflects some deeper public concerns.

One such concern is that higher education has become very costly, often resulting in immense post-degree debilitating debt burdens. This issue often reaches into the political realm. Recent riots in the streets of Athens resulted from a government thrust to cut costs by privatizing heretofore public universities. This economic shift will decrease access and increase the cost of education in Greece.¹⁰

Another concern is that higher education is simply irrelevant to the demands of the modern workplace. Only 36% of Americans tell pollsters that they have significant confidence in higher education. This is down from 57% less than a decade ago.¹¹

course offerings opened affordable stay-at-home options to study remotely from well-established public and private institutions worldwide. Derek Bruff, a strategic advisor of the University Professional and Continuing Education Association (UPCEA) and associate director for Excellence in Teaching and Learning at the University of Michigan, observes that “students of all ages and backgrounds are increasingly seeking online and asynchronous class options.”¹²

Finally, the advent of cutting-edge technologies, such as data analytics, machine learning (ML), digital twins, graph algorithms, vector databases, and large language models (LLM), is changing the corporate landscape. Generative AI now also offers the potential to revitalize education at all levels, especially as LLMs gain speed and capacity via added vectors, become inoculated against hallucination, and gain added mathematical capability.

INDUSTRIAL RESPONSE

These concerns are not without reaction. Corporations are working to develop in-house training programs to offset their perceived internal skills shortfalls. For example, IBM and the Global System for Mobile Communications Association have partnered in an AI school to enhance the telecommunications industry through research, education, and innovation to help the field adapt to generative AI.¹³

Microsoft has committed to training 2 million residents of India on the use of generative AI.¹⁴ Facing severe aircrew shortages, U.S. airlines are establishing their own flight training facilities. Some LLM generative pre-trained transformers offer an online means to learn coding. The Amazon Web Services (AWS) Skill Builder offers online on-demand training for selected skills involving the cloud. AWS has established 13 statewide joint partnerships engaging educators, policymakers, government agencies, economic developers, and employers.¹⁵ Many firms are flirting with adding a chief online learning officer to the ranks of their C-suites.¹² Importantly, many companies, including firms such as IBM and Accenture, are reducing barriers to career entry by relaxing or eliminating the college degree as a prerequisite for initial employment.

SKILLS GAP ASSESSMENT

An ongoing and perplexing issue remains elusive: how to truly assess the skills gap with meaningful metrics. The international Organisation for Economic Co-operation and Development is beginning to deploy a Program for the International Assessment of Adult Competencies-based employer assessment tool. This survey instrument, first deployed in the European Union in 2021 and 2022, is designed to assess how skills gaps affect corporate performance and how managerial and training intervention can favor skills deployment.¹ It is aimed at improving industrial practices. Existing skills gap assessments have begun to spawn new initiatives. In Maryland, the Kirwan Commission-inspired “Blueprint for Education” spotlights career pathways starting in K-12 and extending through college. This new approach offers clear incremental work-related educational outcomes. Based on a skills gap assessment, the UPCEA predicts that schools will rebrand based on certificate programs and

continuing professional education degrees focused on work and career.⁶

EDUCATIONAL REFORM

This all suggests that the consideration of educational reform is no longer a luxury in the workplace. This is further complicated by a global teacher shortage coupled with an inability to retain experienced teachers.¹⁶ While not all school systems are in peril, as in Iceland, some Northern European countries, and Australia, many school systems are often understaffed and must fight for the few available teaching candidates. Many are forced to raise entry salaries or drastically reduce qualifications. With a spate of post-COVID-19 retirements, the ranks of seasoned mentors are also diminishing. At the same time, post-COVID-19 student attendance is reportedly declining at alarming rates. As is the case in Finland, teaching must be elevated to a respected well-paid profession.

Timely research also reveals that recent college graduates often lack fundamental linguistic and mathematical skills. While partially attributable to COVID-19, recent graduates are not inclined to read long texts. More attuned to terse rapid-fire smartphone exchanges, many resist reading as little as 10 pages at a time.¹⁷ Another study shows that a loss of interest in mathematics occurs early in the K-12 learning process, resulting in many students intentionally avoiding higher mathematics as a career objective.¹⁸ Unfortunately, to view technology other than as a result of applied magic, a more than passing appreciation of applicable mathematics seems to be a fitting prerequisite to genuinely understanding what technology is all about. Given these results, one could easily argue the paradox that technology has become a possible disrupter of education, just as education has become essential to technological advancement, especially in the workplace.

As noted, reluctance to embrace mathematics and so-called math anxiety

present a serious shortfall when appreciating technology's inner workings. Joshua Rosenberg, faculty fellow at the Center for Enhancing Education in Mathematics and Sciences at the University of Tennessee, notes that science deals with uncertainty, and as such, the notions of probability and uncertainty must be introduced at an early age and reinforced

that new disciplines, such as chaos theory, complexity science, and more recently, network science, have matured and contributed to new modes of high-level scientific inquiry. These developments involve different mathematical practices. They embrace big data analysis techniques, combinatorics underlying much of modern AI, and revolutionary world-changing graph

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throughout education.¹⁹ This seems fitting in today's AI-infused market in that ML and much of AI are all about applied combinatorics. Others note that mathematics is often presented as problems with singular correct solutions, enhancing computational skills but bypassing valuable linguistic, cognitive, and reasoning skills.²⁰ In short, K-12 mathematical problems should not be rote but should be relevant to real-world problems, often allowing more than one correct solution.

Skills relating to nonlinear problem-solving have become more important since the advent of the World Wide Web (WWW). For better or worse, the WWW offered an alternative to the then-prevailing industrial-age belief systems. Indeed, Newtonian physics and its strong linear logic allowed almost two centuries of phenomenal growth of industry and infrastructure. While this belief reinforces the practice of sound engineering and manufacturing, it by no means underlies the sciences where uncertainty is commonplace. It also demoted the importance of the humanities. The WWW (and indeed digital technology) established that nonlinear relationships can and do coexist with linear logic. The WWW is all about linkages between entities. Thus, it is not shocking

theory and their related algorithms. These forms of mathematics, not yet in the mainstream for lifelong learners, nonetheless underlie modern technology. They deal with multiple relationships where cause is often decoupled from effect.

Significantly, such nonlinear chains of events have become exceedingly relevant. This resembles classic aircraft accident investigation, where any contributory event, if slightly altered, can avert an otherwise disastrous outcome. This further reinforces the reality that many seemingly disparate topics are intertwined. For example, automation has become ubiquitous in many disciplines, including the liberal arts. Practitioners in these fields must often thoroughly understand their discipline's unique technological aspects to succeed in their careers. Professional success often implies strong cross-discipline knowledge extending beyond specialized technological know-how. Of course, most professions require a solid foundation in effective self-expression and all relevant mathematics. The post-WWW lessons, however, often remain elitist despite the everyday implications these lessons possess to citizens who increasingly rely on technologies, the workings of which they barely understand.

As former Macalester College president and president-in-residence at the Harvard Graduate School of Education, Brian Rosenberg, notes, “The American university is an almost perfect deflector of change—at a time when change is absolutely necessary.”²¹ Given this backdrop, what sort of change might be required?

NEAR-TERM REMEDIES

An immediate reply is to harness technology for the more effective delivery of education. New educational technologies, such as intelligent agents, virtual tutors, synthetic reality, and responsive

- › Credit for Prior Learning: ... Competency-based learning and bridging the knowledge gap are alternatives to repetition.
- › Flexible Learning Structures: Traditional semester-based systems may not suit all motivated learners. Universities should offer flexible timing, shorter-term programs, and multiple start dates to accommodate busy schedules.
- › Modularity of Offerings: Modular courses and prior

Industry partnerships

- › Partner with leading corporations to create a wide range of industry-backed specific skills-based modular short courses that lead to the certification of skills, both hard and soft, that are technical, cognitive, engagement, ethical, managerial, physical, self-efficacy, collaborative, etc. in nature.⁷ This range extends the requisite soft skills well beyond the technological. It suggests that a cross-disciplinary approach, including the liberal arts, with modified pedagogy, is necessary.
- › Structure modular skill-based certification courses that can be stackable toward a degree.
- › Build custom holistic degree programs across disciplines that satisfy industry skill demands.
- › Build partnerships with local industries to benefit themselves by
 - investing in short-course adjunct instructor training from within their professional ranks to ensure hands-on knowledge
 - investing in student and employee matriculation through financial assistance and scholarships
 - offering employment to properly certified individuals to fulfill identified skills gaps focused on interdisciplinary education.
- › Engage in joint independent research on educational topics involving semiautonomous academic delivery through the following:
 - personalized education
 - automated curriculum development
 - online best practices
 - technology augmentation, including the following:
 - o generative AI
 - o synthetic reality
 - o digital twins.

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and adaptive curricula, hold promise to help learners across the board. Properly and ethically applied, these technologies can touch every age, influence ability, and build experience. In this context, personalized learning may finally fall within reach. In turn, personalized learning may lead to more robust career-connected pathways, more culturally relevant curricula, and a means of improving student involvement, interest, and attendance.²² These are promising areas for ongoing research, deployment, and teacher in-service training. Research in these fields also encourages modern systems thinking, which often spans disciplines.

But, as is often the case, technology tips the iceberg. Underlying policies and practices must also be put into place to enable real reform. One study sums up some of the structural changes needed.²³

- › “Reducing Bureaucracy: Streamlining admissions, financial aid, and course evaluation processes is essential...

knowledge assessment can accelerate learning. This approach benefits not only returning students but also personalizes education for all.

- › Financial Aid: Tailored financial aid policies are necessary, as one size does not fit all.
- › Clear Career Pathways: ... Universities should integrate career development resources and industry partnerships into their programs.
- › Network Building: ... Universities should facilitate intentional networking opportunities and support services.”

The last two points on network building are essential. Dynamic partnerships matter. Hence, the author humbly offers the following suggestions to better establish skills reinforcement as a near-term function of a lifelong skills learning higher education commitment.

- › Adopt these digital interactive tools in industry certification delivery initiatives.

School district partnerships

- › Springboard on existing pathway enrollments to justify sizeable cadres within existing pathway fields. Eliminate all barriers to introductory course entry but reinforce strict performance-based outcomes.
- › Commit to educating future educators with a sharp focus on updated curricula and delivery mechanisms that are culturally and technically relevant.
- › Build on the strength of enlightened teacher professionalization through fostering leading-edge graduate education programs focused on interdisciplinary education.
- › Encourage dual enrollments wherever possible.

Community college partnerships

- › Team with community colleges where short course certification preexists and focuses on novel advanced industrial certifications beyond the associate of arts (A.A.) level in these instances.
- › Engage in community college articulation agreements to build high-potential upper-level offerings.

Legislative partnerships

Seek legislative relief from various state regulations that restrict skills-based education focused on the high school, associate, or bachelor degree holder for the lifelong learner. 

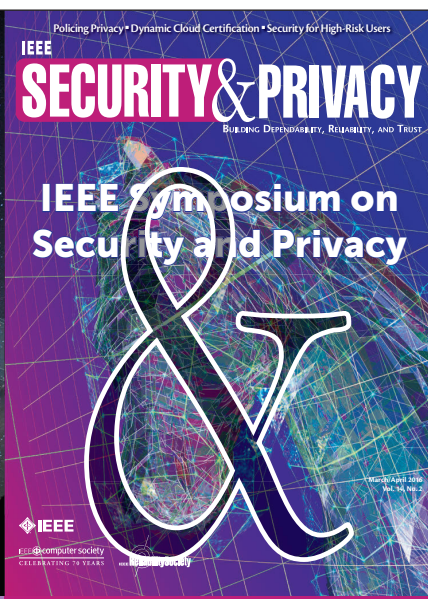
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